

**REMARKS**

**I. Introduction**

In response to the Office Action dated August 31, 2010, Applicants have amended claim 1 in order to further clarify the subject matter of the present disclosure. Claims 14-16 have been cancelled, without prejudice. Support for the amendments to claim 1 may be found, for example, in original claims 14-16, battery A11 of Table 2, and page 27, lines 6-10 of the specification. Applicants have taken care to avoid the introduction of new matter.

A Request for Continued Examination (RCE) is being filed concurrently herewith.

For the reasons set forth below, Applicants respectfully submit that all pending claims are patentable over the cited prior art references.

**II. The Rejection Of Claims 1-3 And 8-18 Under 35 U.S.C. § 103**

Claims 1, 3, 8-10, 13, 14, 17 and 18 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Suzuki et al. (US 2002/0037450) in view of Delnick (USP No. 5,948,464), and Kizu (US 2003/0165739); claim 2 as being unpatentable over Suzuki, Delnick, and Kizu as evidenced by the melting point of acrylonitrile retrieved from <http://scientificpolymer.com/catalog/description.sap?QProductCode=134> on 3/27/2010; claim 11 as being unpatentable over Suzuki in view of Delnick and Kizu and further in view of Ota et al. (USP No. 6,365,300); claim 12 as being unpatentable over Suzuki in view of Delnick and Kizu and further in view of Hampden-Smith et al. (US 2002/0168570); and claims 15-16 as being unpatentable over Suzuki in view of Delnick and Kizu and further in view of Daroux et al. (USP No. 6,562,511). Applicants respectfully submit that Suzuki, Delnick, Kizu,

scientificpolymer, Ota, Hampden-Smith and Daroux fail to render the pending claims obvious for at least the following reasons.

With regard to the present disclosure, amended independent claim 1 recites, in part, a lithium ion secondary battery comprising a positive electrode for absorbing and desorbing lithium ion, a negative electrode for absorbing and desorbing lithium ion, and a porous film interposed between the positive electrode and the negative electrode. The porous film has a thickness of 0.5 to 20  $\mu\text{m}$ . The battery also comprises a sheet separator interposed between the positive electrode and the porous film. The sheet separator has a thickness of 8 to 25  $\mu\text{m}$  and is made of a polyolefin resin. The porous film is adhered to a surface of at least the negative electrode. A total thickness of the sheet separator and the porous film is 15 to 30  $\mu\text{m}$ .

Features of the present disclosure are that the porous film and sheet separator of the lithium ion secondary battery are interposed between the positive electrode and the negative electrode, with the sheet separator being interposed between the positive electrode and the porous film. The porous film is adhered to a surface of at least the negative electrode. For example, as shown in Fig. 3 of the drawings, the porous film/separator sheet 31 is interposed between the positive 23 and negative 27 electrodes, and is adhered to the negative electrode 27. As is disclosed on page 10, lines 2-5 of the specification, by further providing a separator interposed between the positive electrode and the negative electrode to a lithium ion secondary battery of the present disclosure, a higher safety can be achieved.

When a great amount of heat is generated by a short circuit, the shrinkage of the porous film with the separator cannot be avoided, regardless of the heat resistance of the porous film itself. Thus, by forming the porous film adhered to a surface of an electrode, asperities of the surface of an electrode material mixture layer are covered with the porous film, making the

friction of electrode surface small. As a result, a separation of the material mixture can be suppressed effectively.

It is admitted that Suzuki and Delnick fail to disclose a separator interposed between the positive and negative electrodes. Nor do the references disclose a separator interposed between the positive electrode and the porous film. Moreover, Kizu, Ota, and Hampden-Smith do not, and are not relied upon to remedy this deficiency. It is asserted that Daroux teaches a separator for a Li-ion polymer battery comprised of a plurality of separator layers that are laminated together. Based on this, it is alleged that it would have been obvious to make the battery of Suzuki having two separators. Applicants respectfully disagree.

As recited above, in claim 1, the porous film is adhered to the negative electrode. As a result, the porous film will not shrink upon heating during short circuit conditions. In contrast, Suzuki fails to teach or suggest a porous film adhered to the negative electrode. Rather, Suzuki teaches winding a positive electrode and a negative electrode with a separator interposed therebetween. Thus, when the battery of Suzuki heats during short-circuit conditions, the separator and porous film will shrink.

Moreover, claim 1 recites a sheet separator that is comprised of polyolefin. In contrast, none of the cited prior art references teach a polyolefin separator material. For example, Daroux teaches separator materials comprised of polyvinylidene fluoride and dibutyl phthalate, neither of which are polyolefins. As such, it is clear that the combination of prior art fails to disclose all of the limitations of amended claim 1.

Furthermore, the combination of the prior art references appears to be due solely to improper hindsight reasoning. In order to arrive at the present claims, one skilled in the art

would have to view the present disclosure to obtain the necessary suggestion or motivation to combine the cited prior art references in a manner necessary to arrive at the claimed device.

For example, in order to obtain the present claims, one skilled in the art would have to modify the binder for the porous film of Delnick by using the binder (core-shell type particles) for the positive electrode of Suzuki, modify the separator of Suzuki by replacing it with the modified porous film of Delnick including the binder of Suzuki, and laminate the modified separator of Suzuki replaced with the modified porous film of Delnick as taught by Daroux. This convoluted modification of one prior art element after another would not be readily apparent to one skilled in the art without the hindsight provided by the present disclosure.

During lamination in the present disclosure, a sheet separator made of a polyolefin resin is disposed on a surface to be in contact with the positive electrode. In this configuration, the ranges of the thickness or other parameters are specially selected so that the battery capacity and the battery safety can be well balanced. In order to arrive at the present disclosure, components disclosed in the secondary references would have to be modified one after another, starting with the primary reference of Suzuki, to arrive at the claimed device. However, there is no teaching or suggestion in any of the references for one skilled in the art to arrive at the claimed lithium ion secondary battery based on the combination of the references except by the present disclosure. As such, the combination of the cited prior art is based on improper hindsight reasoning.

Therefore, as is well known, in order to establish *prima facie* obviousness of a claimed invention, all the claim limitations must be taught or suggested by the prior art. As Suzuki, Delnick, Kizu, scientificpolymer, Ota, Hampden-Smith and Daroux do not disclose lithium ion secondary battery comprising: a porous film which comprises an inorganic filler and a first binder, a separator interposed between the positive electrode and the porous film, the sheet

separator being comprised of polyolefin, it is apparent that Suzuki, Delnick, Kizu, scientificopolymer, Ota, Hampden-Smith and Daroux fail to render amended claim 1 or any dependent claims thereon obvious. Accordingly, the Applicants respectfully request that the § 103 rejection be withdrawn.

**III. All Dependent Claims Are Allowable Because The  
Independent Claim From Which They Depend Is Allowable**

Under Federal Circuit guidelines, a dependent claim is nonobvious if the independent claim upon which it depends is allowable because all the limitations of the independent claim are contained in the dependent claims, *Hartness International Inc. v. Simplimatic Engineering Co.*, 819 F.2d at 1100, 1108 (Fed. Cir. 1987). Accordingly, as amended claim 1 is patentable for the reasons set forth above, it is respectfully submitted that all pending dependent claims are also in condition for allowance.

**IV. Conclusion**

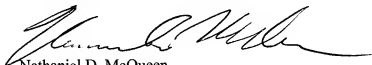
Having responded to all open issues set forth in the Office Action, it is respectfully submitted that all claims are in condition for allowance.

**Application No.: 10/568,536**

To the extent necessary, a petition for an extension of time under 37 C.F.R. 1.136 is hereby made. Please charge any shortage in fees due in connection with the filing of this paper, including extension of time fees, to Deposit Account 500417 and please credit any excess fees to such deposit account.

Respectfully submitted,

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A handwritten signature in black ink, appearing to read 'Nathaniel D. McQueen', written over a horizontal line.

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